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row $(2m-1)$, it is $\dfrac{(2m-1)(2m-2)\ldots.(2m-m)}{1.2.3\ldots.m}$

$$=\frac{(2m-1)(2m-2)\ldots.(m+1)}{1.2.3\ldots.(m-1)}=\frac{(2m)!}{2(m\,!)^2}.$$

The part played by the series in the Theory of Regular Polygons is indicated in an article in the current issue of the *Annals of Mathematics.*

Also solved by *A. H. BELL*, and *Professor J. F. W. SCHEFFER.*

45. **Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.**

Find x from $\cos^{-1}\dfrac{1-x^2}{1+x^2}+\tan^{-1}\dfrac{2x}{1-x^2}=\dfrac{4\pi}{3}$.

I. **Solution by T. W. PALMER, A. M., Professor of Mathematics, University of Alabama; H. W. DRAUGHON, Olio, Mississippi; A. L. FOOTE, C. E., Middlebury, Connecticut; and the PROPOSER.**

Let $\tan\theta=x$. Then $\tan 2\theta=\dfrac{2\tan\theta}{1-\tan^2\theta}$, $=\dfrac{2x}{1-x^2}$; and $\dfrac{1-x^2}{1+x^2}$

$$=\frac{1-\tan^2\theta}{1+\tan^2\theta},\ =\cos^2\theta(1-\tan^2\theta),=(\cos^2\theta-\sin^2\theta),=\cos 2\theta.$$

$$\therefore\ \cos^{-1}\frac{1-x^2}{1+x^2}+\tan^{-1}\frac{2x}{1-x^2},\ =\cos^{-1}\cos 2\theta+\tan^{-1}\tan 2\theta=\frac{4\pi}{3}.$$

$$\therefore\ 2\theta+2\theta,=4\theta,\ =\frac{4\pi}{3},\quad \therefore\ \theta=\frac{\pi}{3},=60^\circ.$$

$$\therefore\ x=\tan\theta,=\tan\frac{\pi}{3},=\tan 60^\circ,=\sqrt{3}.$$

$$\therefore\ x=\sqrt{3}.$$

II. **Solution by JOHN B. FAUGHT, A. B., Indiana University, Bloomington, Indiana; J. A. JOHNSON, Jr., Student of the Sophomore Class, University of Mississippi; P. S. BERG, Apple Creek, Ohio; and J. W. WATSON, Middle Creek, Ohio.**

$$\text{Since }\tan^{-1}\frac{2x}{1-x^2}=\cos^{-1}\frac{1}{\sqrt{1+\dfrac{4x^2}{(1-x^2)^2}}}=\cos^{-1}\frac{1-x^2}{1+x^2};$$

$$\therefore\ 2\cos^{-1}\frac{1-x^2}{1+x^2}=\frac{4}{3}\pi,\ \text{or}\ \cos^{-1}\frac{1-x^2}{1+x^2}=\frac{2}{3}\pi=\cos^{-1}(-\tfrac{1}{2}).$$

$$\therefore\ \frac{1-x^2}{1+x^2}=-\tfrac{1}{2},\ \text{whence}\ x^2=3,\ \text{and}\ x=\pm\sqrt{3}.$$

Alfo solved by *F. P. MATZ, J. SCHEFFER, C. D. SCHMITT, E. L. SHERWOOD, M. C. STEVENS, G. B. M. ZERR*; and ————